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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 09/337,278 | 06/22/1999 | TAISUKE HIROOKA | 990659 | 8796 |
| 23850 | 7590 | 04/20/2004 | EXAMINER | |
| ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP | | | WINTER, GENTLE E | |
| 1725 K STREET, NW | | | ART UNIT | |
| SUITE 1000 | | | PAPER NUMBER | |
| WASHINGTON, DC 20006 | | | 1746 | |

DATE MAILED: 04/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/337,278

Applicant(s)

HIROOKA ET AL.

Examiner

Gentle E. Winter

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,5,7,9 and 10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,5,7,9 and 10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114 was filed in this application after a decision by the Board of Patent Appeals and Interferences, but before the filing of a Notice of Appeal to the Court of Appeals for the Federal Circuit or the commencement of a civil action. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 6 February 2004 has been entered.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyashita U.S. Patent No. 6,167,583, in view of Kanno, U.S. Patent No. 5,873,380 further in view of United States Patent No. 5,741,403 to Tenhover.

2. Claim 1 is drawn to a method of cleaning an alumina titanium carbide electronic component comprising bringing a sponge member into contact with the alumina titanium carbide object to be cleaned while supplying, to said alumina titanium carbide object to be cleaned, water containing carbon dioxide gas having a resistivity value of less than 5MΩ.

3. Both Miyashita and Kanno disclose cleaning wafer substrates, however neither apparently explicitly identifies alumina titanium carbide as the specific substrate acted upon. Tenhover discloses an alumina titanium carbide electronic component. Since the cleaning methods of the prior art are not limited to a specific substrate, the artisan would have been motivated to use the below indicated cleaning techniques for the reasons set forth in Miyashita, removal of contaminants and Kanno, namely to “remove[] contaminants sticking onto a wafer without damaging a device.” These are operations that would be desirably performed on all critical substrates, including that disclosed by Tenhover.

4. Miyashita discloses a cleaning method of an electronic component wherein an object to be cleaned is cleaned by bringing a sponge member into contact with the object to be cleaned (column 1, lines 34-42) while supplying, to the object to be cleaned, water having a resistivity value of about 5 MΩ to 18MΩ (column 1, lines 22-25).

5. Miyashita does not disclose wherein the resistivity of cleaning water is adjusted by including carbon dioxide gas into the cleaning water. However, Kanno discloses wherein the resistivity of cleaning water is adjusted by including carbon dioxide gas into the cleaning water (column 7, lines 11-20).

6. It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the resistivity of the cleaning water by including carbon dioxide gas because

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Kanno teaches that damage of a wafer may be reduced by reducing the resistivity of pure water by mixing a carbon dioxide gas with the water, thereby reducing the static charge generated on the surface of the wafer (column 1, lines 38-41).

7. As to claim 1, since the prior art of Miyashita teaches a "resistivity of about 5 MΩ to 18 MΩ" (column 1, lines 22-23), such range of "about 5 MΩ to 18 MΩ" allows for lower resistivities, thus the ranges overlap. *In re Geisler*, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997). Further, a *prima facie* case of obviousness exists where the claimed range and prior art range do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America V. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985).

8. With respect to claim 5, it would have been obvious to clean ceramic wafers because both Miyashita and Kanno teach cleaning methods of generalized wafers or semiconductor devices, including ceramic or silicon, or as discussed above, with respect to Tenhover, alumina titanium carbide.

9. Claims 3, 7, and 8 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Miyashita in view of Kanno, further in view of Tenhover, as applied to claims 1 and 5 above, and further in view of Simmons et al., U.S. Patent No. 5,693,148.

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10. Neither Miyashita nor Kanno disclose wherein the sponge member is separated from the object to be cleaned during cleaning, and cleaning water supplied also to the separated sponge. However, Simmons discloses wherein the sponge member is separated from the object to be cleaned during cleaning, and cleaning water supplied also to the separated sponge (column 3 lines 10-19; column 4, lines 3-6).

11. It would have been obvious to one of ordinary skill in the art at the time the invention was made to separate the sponge member from the object to be cleaned during cleaning, and supplying cleaning water to the separated sponge because Simmons teaches that cleaning contaminants from the brush/sponge causes contaminants to be repelled from the brush/sponge, thus reducing or even eliminating brush/sponge load-up (column 2, lines 11-18), thus extending the useful lifetime of the brush/sponge (column 3, lines 1-2).

12. Claims 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyashita, in view of Kanno, and Takehiko as applied to claims 1 and 5 above, further in view of Simmons et al U.S. Patent No. 5,693,148.

13. Neither Miyashita, Kanno, nor Takehiko disclose wherein the sponge member is separated from the object to be cleaned during cleaning, and cleaning water supplied also to the separated sponge. However, Simmons discloses wherein the sponge member is separated from the object to be cleaned during cleaning, and cleaning water supplied also to the separated sponge (column 3, lines 10-19; column 4, lines 3-6).

14. It would have been obvious to one of ordinary skill in the art at the time the invention was made to separate the sponge member from the object to be cleaned during cleaning, and supplying cleaning water to the separated sponge because Simmons teaches that cleaning contaminants from the brush/sponge causes contaminants to be repelled from the brush/sponge, thus reducing or even eliminating brush/sponge load-up (column 2, lines 11-18), thus extending the useful lifetime of the brush/sponge (column 3, lines 1-2).

15. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyashita, in view of Kanno, Tenhover and Simmons as applied to claims 1, 3, 5, and 7 above, further in view of Chung et al., U.S. Patent No. 5,336,371.

16. Neither Miyashita, Kanno, nor Simmons explicitly disclose that the object to be cleaned is soaked in cleaning water having the resistivity value of 10 MΩ or less before cleaning. However, Chung discloses wherein the object to be cleaned is soaked in cleaning water before cleaning (column 2, lines 54-62).

17. It would have been obvious to one of ordinary skill in the art at the time the invention was made to soak the object to be cleaned in cleaning water before cleaning because Chung teaches that after a photolithography process and stripping of the photoresist, the photoresist stripper must be removed from the wafer by a process such as rinsing before further wafer processing (column I, lines 23-25; column 3, lines 50-52).

18. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,336,37 to Chung et al., in view of Takehiko as applied to claims 1, 3, 5, and 7 above. Chung discloses that the object to be cleaned is soaked in cleaning water having the resistivity value of 10 MΩ or less before cleaning. A resistivity of 10 MΩ is extremely pure. Virtually any contaminant will reduce the resistivity. Chung discloses wherein the object to be cleaned is soaked in cleaning water before cleaning (column 2, lines 54-62).

19. It would have been obvious to one of ordinary skill in the art at the time the invention was made to soak the object to be cleaned in cleaning water before cleaning because Chung teaches that contaminants must be removed from the wafer by a process such as rinsing before further wafer processing (column 1, lines 23-25; column 3, lines 50-52). The decontamination is also required for the wafer of Tehover. It is noteworthy that submerging a wafer in an acid would meet the claim requirements. Applicant may elect to specify a range that includes a lower limit if a high degree of purity is required.

Affidavit

20. Applicant has submitted a declaration including data showing what appears to be a meaningful improvement in particle removal rate when resistivity is 5MΩ or less. It is noted that the water resistivity, in the experiment reported in the affidavit, was apparently altered solely by the addition of carbon dioxide, and the particle removal rate was only demonstrated with respect to particles having a size in excess of 5 microns. Additionally, brushing and spin drying steps

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were disclosed as steps in the sequence that produced the indicated results. The vertical axis, plots particle elimination *rate* yet only one time value is disclosed, namely 30 seconds.

Applicant's observations regarding elimination rate are considered meaningful, but no rate appears in, at least, claim 1. The affidavit has been considered, but fails to correlate the scope of the claim with the scope of the affidavit. It appears that if applicant were to claim the test conditions (temperature, source of resistivity change etc) the same would seemingly indicate that applicant is achieving unexpected results and would be meaningful in arguments related to the propriety of making the instant combination.

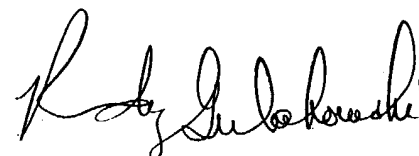
Conclusion

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gentle E. Winter whose telephone number is (571) 272-1310. The examiner can normally be reached on Monday-Friday 7:00-3:30.

22. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on (571) 272-1302. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

23. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 273-1310.

Gentle E. Winter
Examiner
Art Unit 1746



RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700